"Building a Children's Environmental Health Program:
California's Experience"

Arizona's Children's Health and Environment:
Making the Connections
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This afternoon, I will talk about how California initiated its Children's health programs, how we implement the programs at Cal/EPA, a few highlights of our successes, and where we see ourselves going over the next three years.

How we got started

In 1997 and 1998, there was a growing concern that the way federal and state agencies were conducting health risk assessments was not necessarily protective of children. Yes, we were using multiple safety factors (a 10-fold factor for intra-species variability) and conservative estimates of cancer risk (the 95th %'ile of the upper confidence limit on the slope of the dose-response curve), but there was still concern about children's unique exposures and special vulnerability during their developing years. Most risk assessments are conducted for a lifetime, or 70 years of exposure that assume a constant rate of exposure. But, when you take a closer look, you find that young children breathe, eat, and drink liquids at a rate about three-fold greater, on a pound-for-pound basis, than

adults. So, during this early period in life they can have a three-fold or greater exposure than adults that comes at a time when their bodies are undergoing development, especially neurological development. We began to ask, “are our assumptions correct, and moreover, do they provide an adequate margin of safety for children”.

The person who took up this issue in the California Legislature was Senator Martha Escutia. Her early efforts to pass legislation that would cause us to re-evaluate our assumptions about children’s exposures were unsuccessful. But, in 1999, newly-elected Governor Gray Davis signed Senator Escutia’s Senate Bill 25 into law as part of his campaign promise to the electorate and his genuine concern for children’s health and their education.

Senate Bill 25 directed Cal/EPA to do a number of important things, a few of which are:

- The Air Resources Board was required to review **all** existing health-based ambient air quality standards for the specific purpose of determining whether the standards adequately protect the health of the public, **including infants and children**. You will recognize the ambient air quality standards as “criteria air pollutants”, those that each state must meet to be in compliance with the federal Clean Air Act. These are pollutants like ozone, particulate material, and oxides of nitrogen, and four others that make up the federal standards.

- Cal/EPA’s Office of Environmental Health Hazard Assessment was required to establish a list of up to 5 specific toxic air contaminants the

may cause **infants and children** to be especially susceptible to illness. In California, “toxic air contaminants”, or TACs, include those chemicals on the list of federal “hazardous air pollutants”, or HAPs, and a few of our own thrown in.

What is significant about the “list” is that the Air Resources Board is required to revise any **control measures** for these 5 toxic air contaminants to reduce exposures. Control measures are typically embodied in regulations that identify ways the private and public sectors must reduce emissions of a particular toxic air contaminant. I will give you a good example of this in a moment.

Senate Bill 25 did not include drinking water because this had been included in earlier legislation (Byron Sher’s PHG legislation) that mandated a review of all of California’s drinking water standards to make sure they reflected the latest toxicological and human health data. This legislation required that our drinking water standards be protective of sensitive subpopulations, of which infants and children are one group.

Senate Bill 25 also created within the Office of the Secretary for Environmental Protection a Children’s Environmental Health Center. The role of the Center is to coordinate the activities of Cal/EPA’s boards, departments and offices in the implementation of Senate Bill 25 and the Governor’s Initiative on children’s environmental Health. The Center is also responsible for a biennial report to the Governor and the Legislature on the implementation of Senate Bill 25 and other children’s health legislation.

(I brought a few copies of our 2002 report and if you did not get one, just give me your business card, I will have one sent to you. It is also available on our web page at www.calepa.ca.gov/ChildHealth)

I would like to make a few comments about the successes of SB 25 in improving our air quality standards and protecting children's environmental health.

Revised PM standards

Particulate material, both fine (2.5 micron diameter) and coarse (10 micron diameter) were the first ambient air quality standards to be reviewed for adequacy of protecting the public's health, including that of infants and children. The health assessment showed two subpopulations at greater risk than the general population, these were seniors and children. Based on both the health assessment conducted by staff of the Office of Environmental Health Hazard Assessment and an exposure assessment by staff of the Air Resources Board, the ARB revised downward the annual average standard for PM10 from _____ to 20 ug/m3 and established a new annual average standard for fine particulates of 12 ug/m3. These compare to the corresponding federal standards of 50 and 15 ug/m3. 24-hour standards were also developed for PM10 and PM2.5, but due to a technical error in the studies, the 24-hour standards were postponed for formal review and adoption this year. The significance of California having somewhat lower ambient air quality standards than the national standards is that we develop our air toxics control measures to meet California's ambient air quality standards. These standards do not affect whether

California is in attainment for any one of the criteria air pollutants, it is the national standards that prevail.

Ozone next

As you heard from Dr. Peters this morning, ozone is a very real threat to children's health, especially those with asthma. Ozone is the second air quality standard to be evaluated under Senate Bill 25. The evaluation is still in progress and ARB anticipates release of the first draft of its Internal Staff Report this Spring and it could go before the Board before the end of the year. The current California 1-hour standard for ozone is 0.09 ppb compared to the corresponding federal standard of 0.12 ppb. California does not currently have an 8-hour standard but uses the federal standard of 0.08 ppb. I think that based on some of the outstanding work that has been done at USC by Dr. Peter's group and elsewhere on ozone's effects on lung development (e.g., Prof. Plopper's work at UC Davis on young primates), there is a likelihood that California's standard will be tightened and we may adopt a new 8-hour standard.

Oxides of Nitrogen, or NOx is coming

NOx will be the third ambient air quality standard to be reviewed under SB 25. The first public review draft of the health and exposure assessment will come out next Spring with a Board hearing in late 2004.

School bus idling

I mentioned earlier that California develops air toxic control measures, or ATCMs, for specified toxic air contaminants. Diesel exhaust is a toxic air

contaminant that has both a cancer risk and a non-cancer health risks. These quantitative estimates of health risk have allowed the Air Resources Board to develop measures that reduce the particulate material that comes from both stationary and mobile sources of diesel exhaust. In particular, it has allowed the ARB to develop an air toxic control measure requiring reduced idling of school buses and other diesel vehicles operated near a school or school bus stop. This has been one of our successes in reducing exposures to children to the harmful effects of diesel exhaust while they are traveling to and from school and while they are at school. In short, drivers of a school bus, transit bus, or other commercial motor vehicle must manually turn off the bus or vehicle engine upon arriving at a school. They cannot restart the engine more than 30 seconds before departing. Drivers would be prohibited from idling more than 5 minutes at each bus stop or school activity location more than 100 feet from a school. Obviously, idling necessary for health, safety, or operational concerns are exempt from this regulation. Children need not enter a bus that is freezing cold or boiling hot! Our final regulation package was submitted for approval (by OAL) on the 15th of May. It should become law in less than 90 days.

School Bus Exposures

Children who commute to school on diesel school buses are potentially exposed to higher levels of vehicle pollution. Over the last two years, the California Air Resource Board has investigated exposures to children while riding school buses.

To investigate these potential exposures, pollutant concentrations were measured inside five conventional diesel-fueled school buses. For comparison, a diesel bus outfitted with a particulate trap and a bus

powered by natural gas were also included. The study was conducted over actual school bus routes covering an area from South Central to Western Los Angeles.

Measurements made on-board school buses in Los Angeles indicated that significantly higher exposures to vehicle-related pollutants are occurring during children's commutes than ambient air concentrations would indicate. These exposures resulted primarily from the commute itself, and not from loading, unloading, or waiting at bus stops that typically involve less time and have lower ambient concentrations. Higher exposures during the commute had several causes:

- the high concentrations of pollutants already present on roadways, especially during heavy traffic;
- the direct influence of vehicles immediately in front of the bus; and
- the contribution of the bus's own emissions.

The extent of a bus's own contribution to these high concentrations appeared to be higher when windows were **closed** and higher for older more polluting buses. Vehicle-related pollutants such as black carbon - an indicator of diesel particulate material -, polycyclic aromatic hydrocarbons (PAHs), and nitrogen dioxide (NO_2), were consistently several times higher inside conventional diesel buses compared to the compressed natural gas (CNG) bus or the particle trap-equipped diesel bus. However, there was significant bus-to-bus variability because of the small number of buses studied and the limited type and number of routes driven. Therefore, the differences observed in ARB's study may be different for other buses driven under different conditions. Nevertheless, this school bus study

demonstrates the potential for school-related exposures that should be reduced when and where possible. The ARB's report from this study will be released the end of June, 2003.

Portable Classrooms

Approximately 40% of California's classrooms are portable, or relocatable units. This large percentage is primarily the result of the limit on the number of students in a classroom in elementary schools. In California, no more than 22 students may be in a grade school class. And, there is also increased demand for space due to California's rapidly growing population. The most expeditious way to meet these demands was to use portable classrooms.

Children spend about 25% of their average weekday time in the school classroom. This time may represent a significant source of a child's total exposure. Ensuring that the classroom environment is not a threat to children's environmental health was a concern of the Governor and the Legislature in 2000. Legislation (AB 2872, Shelley) was signed into law that required the Air Resources Board and the state Department of Health Services to evaluate the school ventilation systems and maintenance practices, assess indoor air quality, and identify any toxic contamination including molds and allergens.

In 2000, ARB contracted for a survey of California teachers and facility managers at more than 1,000 randomly selected schools. Formaldehyde data was collected from a smaller number of these schools. In phase 2 of the study, ARB's contractor collected comprehensive chemical, biological,

and environmental measurements in 201 classrooms at 67 schools statewide. At each school, one traditional and two portable classrooms were evaluated. In addition to formaldehyde, investigators collected data on benzene and chloroform, real-time particle counts, molds, allergens, carbon monoxide, temperature, and humidity. The contractor also conducted on-site assessments of heating, ventilation, and air conditioning systems. Preliminary results indicate that formaldehyde continues to be a problem in portable classrooms and, to a lesser extent, traditional classrooms. Formaldehyde is a carcinogen. Unfortunately, it is still used in adhesives and binders used in the manufacture of office furniture, wall paneling, and some floor coverings. We learned a lot about formaldehyde in the 1980's in a study of mobile homes, so it was not too surprising that it would show up in portable classrooms.

A positive outcome of the portable classroom study will be recommendations for improvements developed in consultation with school districts, portable classroom manufacturers, state agencies, and other interested parties. A draft of this report will be posted on ARB's web site at www.arb.ca.gov/research/indoor/pcs/pcs.htm early next month (June).

Integrated Pest Management or IPM

The use of pesticides in schools has long been a concern in California and other states. In 1993, concern over potential exposures to children motivated California's Department of Pesticide Regulation (DPR) to begin a pilot program to work with interested school districts to provide them information about integrated pest management (IPM) practices and assist them in developing a voluntary IPM program. IPM is an approach to pest

management that focuses on long-term prevention or suppression of pest problems. This is done through a combination of techniques such as monitoring for infestation and establishing treatment threshold levels, using non-chemical practices. The intent is to make the school environment less conducive to pest development by improving sanitation and employing mechanical and physical controls. Pesticides that pose the least possible hazard and minimize risks to people, property, and the environment are used only after careful monitoring indicates they are needed.

In September of 2000, Governor Gray Davis signed the Healthy Schools Act putting into statute the Department of Pesticide Regulations' existing voluntary California School IPM Program. The law also adds new right-to-know requirements regarding pesticides, such as notification, posting, and record keeping for schools, and enhanced pesticide use reporting for licensed pest control businesses.

A few of the requirements include:

- Each school district shall annually **provide written notification** with specified information on pesticides to all school staff and parents or guardians of students.
- Each school shall provide the opportunity for interested staff and parents to **register** with the school district if they want to be notified of individual pesticide applications at the school before they occur.
- The school district shall **post warning signs** at each area of the school where pesticides will be applied. These signs are posted 24 hours in advance and 72 hours after applications and should be

sufficient, in the district's opinion, to restrict uninformed access to treated areas.

- Each school shall **maintain records** of all pesticide use at the school for four years and make the records available to the public upon request.
- Each school district is to designate an individual (also known as an **IPM coordinator**) to carry out these requirements.

The Healthy Schools Act establishes least-hazardous integrated pest management as the state's preferred method of school pest control. A summary of our program can be found in the biennial Children's Environmental Health Report or on DPR's web page www.cdpr.ca.gov

Future Directions

Last year, our Children's Environmental Health Center collaborated with the Environmental Council of the States and the Association of State and Territorial Health Officials to develop an "action agenda" to reduce the incidence of childhood asthma. Many states have experienced a rapid increase in the prevalence of asthma in children. As Professor Peters has pointed out, some of this can be attributed to air pollution. To help reduce other sources, we work towards implementing many of the recommendations of the ECOS-ASTHO "action agenda".

California will continue its efforts to better understand the linkage between the environment, particularly air pollution, and asthma in children. One such study is underway in Fresno California.

The focus of the Fresno Asthmatic Children's Environment Study, or FACES, is on how various environmental factors influence the way a child's asthma progresses over time. Among the environmental influences of interest are air pollutants from man-made and natural sources. A major focus of this study is on the different components of coarse and fine particulate matter, for example, their mass and particle numbers and their chemical constituents, including metals and adsorbed organic compounds. The influence of other air pollutants, including ozone (O_3), oxides of nitrogen (NO_2, NO), sulfur dioxide (SO_2), and carbon monoxide, as well as bioaerosols such as PM-associated endotoxins, fungi and pollen, will also be evaluated. This study should shed more light on some of the environmental factors that influence childhood asthma as children grow. We expect to use the information to evaluate and develop air pollution related public health policies.

California will participate in a national effort sponsored by the Centers for Disease Control and Prevention (CDC) to develop a Public Environmental Health Tracking Network. This long-term program will attempt to identify linkages between the environment, especially air and water, and adverse health outcomes.

Current state legislation obligates us to evaluate all of the ambient air quality standards to determine if they are protective of the public's health including that of infants and children. We must do one of these each year. This will continue for the next 5 years.

We are very fortunate to have employees who are dedicated to the protection of the public's environmental health. The laws that have been

passed mandate programs that require dedication to be implemented. As most of you know, the public process in developing regulations and implementing them is a long one. But, this has worked well for us in California. Working with the regulated community and the public and private sectors has resulted in better regulations and better support for them. It is interesting that a regulation that started out just to limit school bus idling at schools resulted in a regulation that includes all diesel vehicles operating in and around schools because of strong public support.

Thank you for your attention, I would be happy to answer your questions.